

REMARKS

The Office Action mailed on 08/12/09 rejected pending Claims 1-27. Claims 1 and 21 are currently amended. Claims 28-33 are added. No new matter is believed to be added by the present amendments. Support for the amendments can be found, for example, in paragraphs [0007] to [0008], [0025] to [0029], and [0032] of the specification.

Applicants address the rejections in the Office Action mailed 08/12/09 in the order they were provided.

I. Claims 1-4 and 7-27 are rejected under 35 USC 102(b) as anticipated by U.S. Pat No. 7,381,465 (Torimoto et al.)

Claims 1-4 and 7-27 were rejected as allegedly anticipated under 35 USC 102(b) by U.S. Pat No. 7,381,465 (Torimoto et al.). Office Action, page 2. The Office states that “Torimoto, et al teaches a core-shell structure comprising a shell and a nanoparticle inside the shell and a space between the shell and the nanoparticle.” Furthermore, Torimoto et al teach a photoetchable solid core.

Applicants respectfully point out that in the claims as filed and as currently amended, that Applicants claim “a nanocrystal shell having a thickness of at least 0.5 nm, said nanocrystal shell enveloping an empty space...” Torimoto recites a nanoparticle inside the shell, however, Applicants’ claims do not recite a core nanoparticle inside the shell but simply recite a hollow nanocrystal, *i.e.*, a nanocrystal shell. Applicants have amended claim 1 to recite that the hollow nanocrystal is lacking a core unlike the core-shell structure of Torimoto et al. Thus, each and every element of Applicants’ claims are not taught by Torimoto.

The Office action also alleges that “Torimoto teaches a method of making a core-shell structure having a void space inside a shell by coating the surface of the core particle with a first component material and reacting the first component material with a second component material to form the shell.” Office Action, page 2. The Office action then points to Torimoto at col. 3, lines 27-45 and col. 7 line 60 to col. 8 line 8.

Applicants respectfully disagree that Torimoto teaches the method of making hollow nanocrystals as Applicants' claim. In Torimoto Figure 4 (referenced in col. 7 line 60 to col. 8 line 8), the reaction of the first component material (CdS core) and the second component material (3-mercaptopropyltrimethoxysilane) does not form a hollow nanocrystal. Figure 4b shows that a functionalized nanocrystal is made. In Fig.4c, a second reaction and a third component material (trimethoxysilyl) is required to form a solid core-shell that has no void. It is upon further photo-etching and oxidation that a core-shell structure with a void space formed.

In contrast, Applicants' claims as amended recite and the examples show that the first component material reacting with the second material forms in a single step the hollow nanocrystals that lack a core. In Applicants' claimed method the core first material is consumed and transformed during the reaction with the second material and incorporated into the shell of the hollow nanocrystal. No further steps are required to form the hollow nanocrystal. Therefore, because in Torimoto, a second reaction and third material are required, Torimoto does not teach every element of Applicants' claims.

Applicants respectfully submit that Torimoto et al. does not anticipate Applicants' claims because Torimoto does not teach every element of Applicants' claims. Moreover, it would not have been obvious to one having skill in the art to use Torimoto to make Applicants' claimed invention because Applicants claimed hollow nanocrystal lacks a core and is made in a single step reaction unlike Torimoto. In light of the these arguments, Applicants' respectfully request that the rejection be withdrawn and the claims allowed.

II. Claims 1-4, 7-12 and 16-21 are rejected under 35 USC 103 (a) as obvious over Luo et al (J. of Crystal Growth (2005)).

The Office Action rejects claims 1-4, 7-12 and 16-21 under 35 USC 103(a) as unpatentable over Luo et al. published in 2005. Applicants respectfully submit that Luo et al. is not a proper reference that can be cited as prior art against Applicants' claims as it was published in 2005, one year AFTER Applicants' first priority date. Applicants' claim priority in the present

application to U.S. Provisional Patent Application 60/555,590, filed March 22, 2004. In addition, this application is a national stage application of the PCT International Application which was filed October 12, 2004. Both priority documents were filed well before Luo et al was received by the journal and published. Therefore, Applicants respectfully request that the rejections based on Luo et al be withdrawn and the claims allowed.

III. Claims 5 and 6 are rejected under 35 USC 103(a) as obvious over Torimoto.

The Office Action rejects claims 5 and 6 under 35 USC 103(a) as unpatentable over Torimoto. The Office Action alleges that “Torimoto teaches metal as the material for the particulate nanocore (col. 2, lines 65-66). Platinoid and noble metals are known to be one of the best materials for catalyst. Therefore, it would have been obvious to one of ordinary skill in the art to have been motivated to select Pt as the metal for the nanoparticle of the core-shell structure or “hollow” of Torimoto et al.” Office Action, page 4.

Again, Applicants respectfully disagree. Applicants’ claim a hollow nanocrystal, not a core-shell structure as taught by Torimoto. It appears that the Examiner is alleging that the choice of Pt as the “nanocore” or “hollow” would have been obvious to form Pt hollow nanocrystals. In response, Applicants point the Office to Example 10 of the Specification which describes the “Synthesis of Platinum Hollow Nanocrystals”. The Example teaches that the first material can be Co nanocrystals that are reacted with the second material, platinum acetylacetonate, to form hollow platinum nanocrystals. Thus, to make Pt hollow nanocrystals according to the present claims, one need not choose Pt as the “nanocore” or “hollow” to make Pt hollow nanocrystals. Thus, based on the incorrect assumptions of the rejection, it should follow that it would not have been obvious to one having skill in the art to use the nanocore of Torimoto to make Applicants’ claimed hollow nanocrystals.

Applicants submit that the present claims are novel and not obvious over Torimoto.
Applicants' request that the rejection be withdrawn and the claims allowed.

CONCLUSION

Applicants believe that the amended claims are allowable and request that all rejections be withdrawn. A petition for a three-month extension of time is hereby attached and requested. The Office is authorized to deduct \$555 from Deposit Account No. 120690. Please charge any necessary and additional fees that may be due to Deposit Account No. 120690.

For the reasons set forth above, Applicants respectfully request allowance of the pending claims. Should the Examiner believe that a telephone interview would aid in the prosecution of this application, Applicants encourage the Examiner to call the undersigned at (510) 495-2456.

Respectfully submitted,

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BY: /Michelle Chew Wong/
Michelle Chew Wong
Reg. No. 50,456
(510) 495-2456

Lawrence Berkeley National Laboratory
One Cyclotron Road, Mail Stop 56A-120
Berkeley, California 94720
Telephone (510) 486-7058
Facsimile (510) 486-7896